

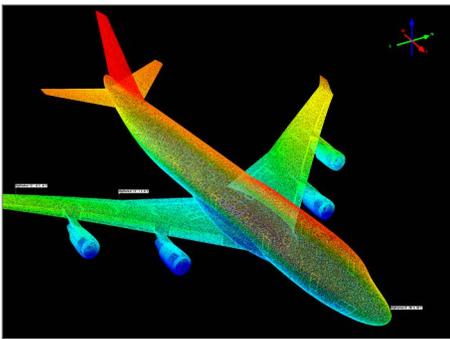


Avitas Systems

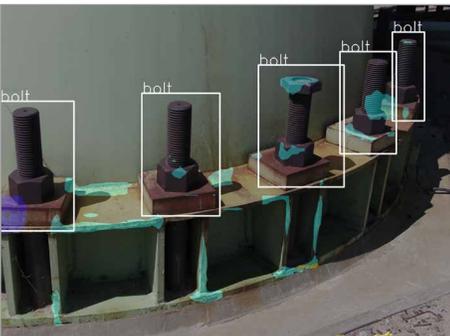
a GE venture

Transforming the
inspection services
industry with new,
advanced analytics

An overview of the Avitas Systems
analytics capabilities
November 2018



Point cloud of aircraft in hangar



Asset identification of bolts and recognition of corrosion severity



View of a 3D model in Avitas Systems DataWorks

Avitas Systems, a GE venture, is the first to offer an end-to-end automated industrial inspection solution integrating advanced analytics and artificial intelligence, precision robotics and sensing to collect high quality inspection data, and inspection procedures that incorporate industry best practices and customer specific risk-based inspection programs. By reducing high-risk tasks through robotics, as well as precision and automated analytics, Avitas Systems makes inspections safer and more efficient, reduces process downtime, and decreases inspection costs up to 25%.

The core of Avitas Systems's value is its data ingestion and managed AI framework that leverages a catalog of curated models and pre-labelled datasets for training and verification to rapidly onboard new assets. The framework also provides in-built mechanisms for continuous learning to ensure reliability of the automated outcomes over the assets and processes lifecycle. The predictive analytics approach combines machine learning techniques with physics- and chemistry-based parametric models to provide a more precise quantification of risk. High-quality inspection data collection, ability to ingest and fuse historical data, and accurate risk models enables intelligent inspection planning using a risk-based assessment methodology.

MANAGED AI FRAMEWORK

The Avitas Systems DataWorks framework offers AI-as-a-managed-service to customers to enable rapid delivery of precise outcomes.

Model catalog: Avitas Systems leverages its understanding of industrial assets and processes to create a curated set of models that can be rapidly trained for site and asset specific deployments. It has a rich set of models for automating visual inspections, internal and external corrosion event prediction, plant trips prediction, and multi-factor analyses to identify leading factors for various asset-specific degradation mechanisms.

Customer workbench: Avitas Systems scales its deployment by using the Avitas Systems DataWorks tool, allowing the field support engineers to rapidly fine-tune various parameters of the models. Using a proven set of models gives Avitas Systems the unique ability to bring customers proven expertise.



Model catalog

A library of common methods that can be used as part of a workbench to fine-tune a customer specific deployment

- > Parameterized solutions
- > Horizontal capabilities like intelligent change analysis, subcomponent/region identification, and intelligent searches



Customer workbench

Toolkit to be used by a group of Analysts/Setup Engineers to personalize/customize models

- > Rapid training using tools and documented methodology
- > Test, evaluation, and deployment of new models



Data catalog

Create repository of tagged benchmark data

- > Datanet for industrial asset data
- > Meta-data standards

Curated model catalog and utilities for intelligent analysis of industrial data

Ability to scale for multiple assets/sites/vertical using site-devoted analysts

Tagged defect and object database with metadata-searchable archival record for continuous learning

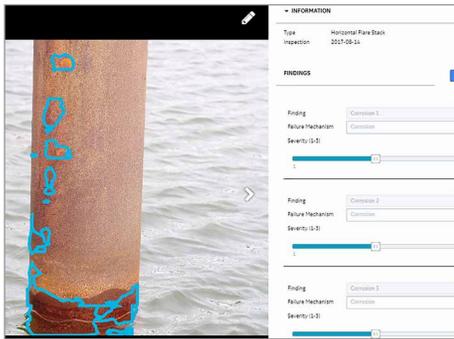
Data catalog: Given the heritage of Avitas Systems, internal expertise and datasets provide labeled data for various industrial defects. The datasets enable the data scientist to train new model and benchmark existing models. Collective learnings further enable Avitas Systems to provide more precise and accurate customer outcomes.

PREDICTIVE MODELING

Avitas Systems DataWorks creates precise predictive models using deep learning and advanced statistical modeling. These models are stored in self-service tool called DataWorks, which can process inspection data in real time and retrain deep learning models to rapidly adapt to new use cases. New methods of learning, tailored to customers' data, can be transferred to pretrained models, which expedites overall deep learning. Avitas Systems also fuses historical data with advanced numerical and machine learning techniques, resulting in robust prediction models that are easy to calibrate and maintain.

Many traditional approaches to modeling focus selectively on physics-based numerical methods or data-driven prediction models, without exploring the interplay between the two. Physics-based numerical methods require considerable initial and ongoing calibration efforts, whereas data-driven machine learning approaches often involve large amounts of representative labelled data. These approaches alone lack the ability to provide both process understanding and predictive modeling of complex heterogeneous relationships.

The Avitas Systems hybrid approach to modeling provides actionable insight and higher accuracy. Avitas Systems applies a library of empirical and mechanistic methods to create an initial learning model for an asset and then incorporates continuous learning approaches. Because the Avitas Systems Platform integrates this evolving library of asset-specific prediction models, inspectors can resolve potential issues earlier and better determine when equipment needs to be replaced.



Avitas Systems Reviewer Workstation flare stack inspection data with defect annotations

OPERATIONAL MODELING

Avitas Systems develops predictive models with an interactive dashboard to understand the complex relationship between various data types. Data is available to inspectors, engineers, and all customer personas from anywhere via a secure, 24/7 web-based platform with geospatial context. The platform also includes features customized to user needs, live alerts, and predictive failure analyses. The Avitas Systems dashboards display network-wide maps of assets with defect classifications and recommend targeted, risk-based inspection planning.

Users can access the Avitas Systems Reviewer Workstation, a web-based interface that provides maps of inspection sites. Avitas Systems provides flexible ingestion, aggregation, and querying capabilities enabling customers a unified view of their enterprise network of assets with access-control based capability to drill down to individual inspection and findings, including ability to livestream remote inspections. This holistic geospatial visualization enhances overall operational situational awareness and enables timely assessments of asset health.

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RISK-BASED ASSESSMENT

Three-dimensional, predictive, and operational modeling leads to safer, smarter, and more efficient risk-based inspection planning for customers. The training that occurs in the DataWorks tool after data ingestion allows the Avitas Systems Platform to automatically identify the severity of defects often not visible to the human eye.

Inspection data streams of various types, including RGB, thermal, single channel and phased array ultrasonic, radiography, magnetic, and LiDAR, can be tagged to specific models for more efficient risk-based assessment. DataWorks streamlines the customization and deployment of asset-specific predictive models with flexible approaches to data ingestion, normalization, and tagging across industries.

Even if inspectors do not detect anomalies, the accessibility and centralization of historical records about asset health optimizes inspection strategies moving forward and better prepares future analytics-based assessments.

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